Important Product Information

GFK-2714R May 2015

PACSystems* RX3i CPU IC695CPE305-ADAP, Firmware Version 8.50

Overview

A firmware upgrade is being made available in support of HART® Pass Through functionality.

Field Upgrades

IC695CPE305 can be upgraded in the field to the most recent firmware (release 8.50) by installing the USB flash drive upgrade kit 41G1733-MS10-000-A8. This kit can be downloaded from http://www.ge-ip.com/support.

New Features

Feature	*Description*
Supports the HART Pass Through Feature	HART-capable RX3i Analog I/O modules can communicate HART data via this CPU to compatible asset management tools. Refer to the *PACSystems HART Pass Through User Manual*, GFK-2929 for more details.

Problems Resolved

Resolved Issue	*Description*
None.	This release is for the indicated feature enhancement only.

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Functional Compatibility

Subject	Description
Proficy* Machine Edition Logic Developer Version Requirements	PME 8.50 SIM 9 or 8.60 SIM 1 or later
Supports the HART Pass Through Feature	HART-capable RX3i Analog I/O modules can communicate HART data via this CPU to compatible asset management tools. Refer to the *PACSystems HART Pass Through User Manual*, GFK-2929 for more details. The following RX3i analog modules support HART: IC695ALG626 IC695ALG628[1] IC695ALG728 If used for HART Pass Through, the supporting RX3i PROFINET Controller (PNC001) and PROFINET Scanner (PNS001 or CEP001) must also contain HART-compatible firmware: IC695PNC001 Firmware Release 2.20 IC695PNS001 Firmware Release 2.30 IC695CEP001 Firmware Release 2.30.
CPU Backward Compatibility	Legacy CPU310 Projects are ***not*** supported on the CPE305.
C Toolkit Compatibility	C Toolkit version 7.00 or later The C Toolkit for PACSystems is distributed with Proficy Machine Edition Logic Developer. Updates can be downloaded from http://www.ge-ip.com/support. **Note:** ***All*** C blocks must be recompiled using the new toolkit before downloading to a release 7.00 or later CPU. The Series 90 Toolkit (IC641SWP709/719) is not compatible with PACSystems.
Backplanes, power supplies and system modules	As listed in the *PACSystems RX3i System Manual,* GFK-2314. Power Sync and Measurement module, IC694PSM001
Series 90-30 Main Rack Compatibility	Series 90-30 Main Racks cannot be used in a PACSystems RX3i system. Series 90-30 CPUs do not operate in PACSystems RX3i Racks.
Isolated 24Vdc power	In applications that use the IC69xALG220/221/222, consult *PACSystems RX3i System Manual*, GFK-2314 for details on wiring the 24Vdc power.
COMMREQ to PBM300	In Release 3.0, the behavior of the COMMREQ fault output on a COMMREQ sent to the PROFIBUS master module IC695PBM300 was changed to be compatible with the Series 90-30 CPU366 PROFIBUS Master. Previously, the fault output was enabled when the module received a COMMREQ and it was busy. Now, the busy condition does not result in the fault output being enabled.
Recommended IC200ALG240 revision	When a VersaMax* system Genius* Network Interface Unit (IC200GBI001) operates with a Genius Bus Controller located in an RX3i, and the VersaMax system contains an IC200ALG240 Analog Input Module, it is recommended to update the IC200ALG240 firmware to Revision 1.20 or later. Upgrade kits are available at http://www.ge-ip.com/support.
Configuration of IC694MDL754	Always configure sixteen bits of module status when using this module. Configuring zero bits of module status will result in invalid data in the module's ESCP status bits.

[1] If used, IC695ALG628 must be installed in the RX3i CPU Rack. At time of publication, it is not supported by PROFINET scanners IC695PNS001 or IC695CEP001. Refer to IPIs for IC695PN001 or IC695CEP001 for future updates.

Release History

Catalog Number	FW Version	Comments
IC695CPE305-ADAP	8.50	Support for RX3i HART Pass Through.
IC695CPE305-ADAN	unchanged	Hardware revision –xDxx modifies the metal housing to provide easier access to the Real Time Clock (RTC) battery from the rear of the module.
IC695CPE305-ACAN	8.30	Adds support for EGD Class 1 on Embedded Ethernet Interface.
IC695CPE305-ACAM	8.20	Adds support for OPC UA.
IC695CPE305-ACAL	8.15	Replaces the module's plastic housing with a metal case, improving noise immunity, reducing emissions, and increasing the mechanical robustness of the product. No change to the module's firmware or functionality.
IC695CPE305-ABAL	8.15	Adds support for IC695RMX228 (128 MB Reflective Memory Module with Single Mode Transceiver.) Adds ability to read reflective memory status bits for IC695CMX128, IC695RMX128, and IC695RMX228 (reflective memory modules). Adds enhanced Ethernet diagnostics capabilities.
IC695CPE305-ABAK	8.05	Adds support for the new IC695ECM850 (IEC 61850 Ethernet Communication Module), which operates as an IEC 61850 Client and provides connectivity to IEC 61850 Server devices. Resolves three issues detailed in *PACSystems RX3i CPU IC695CPE305-ABAK IPI*, GFK-2714K.
IC695CPE305-ABAJ	7.80	Resolves the following issues: • Unable to enter existing CPU password after Enhanced Security enabled. • The PNC0001 fails to reconnect after remote IO power loss. • The PBM300 stops responding after SUS_IO instruction executed.
IC695CPE305-ABAH	7.75	Corrects issues with the OEM lock functionality and with Ethernet communications. Adds support for RX3i CMX/RMX modules version –CG (hardware version Cx with firmware version 2.00 and later). For details, see *PACSystems RX3i CPU IC695CPE305-ABAH IPI*, GFK-2714H.
IC695CPE305-ABAG	7.70	Adds support for the following new modules: IC694MDL758, IC695CNM001 and IC694PSM001. Refer to *PACSystems RX3i CPU IC695CPE305-ABAG IPI,* GFK-2714G for issues resolved.
IC695CPE305-ABAF	7.30	Adds support for Modbus/TCP Server, Modbus/TCP Client, SRTP Server, and SRTP Channels from the embedded Ethernet port. For details, refer to *PACSystems RX7i & RX3i TCP/IP Ethernet Communications User Manual,* GFK-2224L or later.
IC695CPE305-ABAE	7.16	Adds the ability to write DTR and read DSR, DCD, and RI on CPE310 Serial Port 1. This functionality has been implemented (for all CPUs with RS-232 Serial ports) using COMMREQ 4304 (Write Port Control) & COMMREQ 4303 (Read Port Status).
IC695CPE305-ABAD	7.15	Adds native support for the new Power Sync and Measurement module (IC694PSM001) and resolves several issues. Also introduces new features to augment security in the CPU firmware and Proficy Machine Edition software. For details, see *PACSystems RX3i CPU IC695CPE305-ABAD IPI*, GFK-2714D.
IC695CPE305-ABAC	7.14	Corrects an issue where executing a Run Mode Store, displaying the Proficy Machine Edition Show Status window, or requesting data using the PACSAnalyzer tool could cause discrete output modules to unexpectedly change state momentarily (up to one PLC scan). Corrects an issue that was introduced in release 7.13, which prevented configuration of Modbus TCP on Ethernet modules.
IC695CPE305-ABAC	7.13	Corrects issues with Logic Write to Flash (Service Request 57).
IC695CPE305-ABAB	7.11	Resolves the issues detailed in *PACSystems RX3i CPU IC695CPE305-ABAB IPI*, GFK-2714A.
IC695CPE305-AAAA	7.10	Initial release.

Restrictions and Open Issues

***Note*:** Ethernet functionality described below only applies to Rx3i CPUs that provide an embedded Ethernet interface. Additionally, because the CPE310 does not utilize a battery, items related to battery backed memory and/or the battery itself have been removed from this section.

Restrictions and Open Issues

Restriction/Open Issue	*Description*
Serial I/O Half Duplex Mode Failures at Low Baud Rates	When the CPE305 or CPE310 serial port is configured for Serial I/O protocol with 2-wire half-duplex serial port mode with baud rates less than 19.2kBaud, the last transmitted character may end up as the first character in the receive message buffer upon switching from transmitting to receiving.
Rare Power-Up Problem on CPE305 and CPE310	When the CPE305 or CPE310 has logic and configuration source set to flash, in rare instances the controller will power up with all LEDs blinking in unison and the controller will be unreachable. An additional power down and then power up cycle will allow the controller to completely power up.
Missing *Addition of IOC* event when ECM850 module restarts due to reset pushbutton or SVC_REQ 24	When ECM850 module RESET is triggered using SVC_REQ 24 or Reset pushbutton, CPU does not report *Addition of IOC* fault message in Controller fault table after successful reset of module.
Flash part issue on CPE305/CPE310 modules shipped in 2012	When the CPE305 or CPE310 powers down with an Energy Pack connected, all user memory is written out to the NVS flash device. In 2012, GE Intelligent Platforms received a batch of flash memory chips that exhibited longer write times, which exceeded the capabilities of the Energy Pack. This will resulted in the CPE310 not retaining memory during a power-cycle event and logging a *User memory not preserved* fault. The parts that exhibit the extended write times went obsolete in 2012. Units shipped after January 1st, 2013 or prior to 2012 do ***not*** have the substandard part. Units shipped in 2012 that exhibit the symptoms of the issue (*User memory not preserved* fault after power cycle with a working Energy Pack) can be replaced via the warranty return policy.
Ethernet COMMREQs not always delivered on the first logic sweep	In certain instances where User Logic is of sufficient size and a COMMREQ is issued on first logic sweep, the COMMREQ may be aborted before its transmission is attempted. The condition is much more observable on COMMREQs issued from the CPU's embedded Ethernet port. To avoid the possibility of encountering this condition, users should avoid issuing COMMREQs on first logic sweep.
PMM335 loss is occasionally detected on power down of the CPU. (Module is not lost on power-up.)	The PMM335 PACMotion Multi-axis Motion Controller monitors power loss, independently of the CPU. The CPU is fast enough that it can occasionally detect and log the loss of the PMM335 just before the CPU itself powers down. No corrective action is required. This situation can be verified in two ways: (1) by inspecting the timestamp in the *Loss of Module* report one can correlate it with the power-down event, and (2) by performing a PME Show Status Details report to see that the PMM335 is present after power-up.
Ethernet rack-based module fails to exchange EGD data properly during power cycling	Very rarely, after experiencing multiple rapid power cycles, the CPU may fail to establish communication with one or more modules in the backplane at power up. When this occurs, several pairs of *Loss of, or missing option module* and *Reset of option module* faults with identical timestamps will be logged in the controller fault table. If the module is an Ethernet module, an event 30H is recorded in its station manager event log. To recover from this issue, cycle power again.

Restrictions and Open Issues

Restriction/Open Issue	*Description*
Loss of Power Supplies after firmware update	A Loss of Power Supplies after firmware update may occur. This does not happen with all firmware updates and will ***not*** occur if the system is power cycled after the firmware upgrade has completed. The faults displayed when this issue occurs are as follows: 0.0 Loss of, or missing option module 01-12-2009 11:25:38 Error Code Group Action Task Num 36 4 3:Fatal 9 Fault Extra Data: 01 58 02 4f 80 08 0a 07 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Hot swapping some analog modules slowly result in modules not being recognized	Occasionally during a hot insertion (hot swap) of IC695 Non-Isolated Analog Input Modules, input channels may take up to 2 seconds to reflect actual input values after the Module OK bit is enabled in the module status word. This has only been seen when the hot insertion has been done slowly (i.e. approximately 1.5 seconds to insert the module)
Simultaneous clears, loads and stores not supported	Currently, PACSystems CPUs do not support multiple programmers changing CPU contents at the same time. The programming software may generate an error during the operation. Simultaneous loads from a single controller are allowed.
Hardware configuration Not Equal after changing target name	If the user stores a hardware configuration to flash that sets *Logic/Config Power up Source* to *Always Flash* or *Conditional Flash* and then subsequently changes the name of the target in the programming software, the hardware configuration will go Not Equal and will not Verify as equal.
Controller and IO Fault Tables may need to be cleared twice to clear faulted state	Both Controller and IO fault tables may need to be cleared to take the CPU out of Stop/Fault mode. If one of the tables contains a recurring fault, the order in which the tables are cleared may be significant. If the CPU is still in Stop/Fault mode after both tables are cleared, try clearing the fault tables again.
Setting force on/off by storing initial value	Once a force on or force off has been stored to the RX3i, you cannot switch from force on to force off or vice-versa directly by downloading initial values. To turn off the force, perform a download, and then change the force on or off by another download.
Number of active programs returned as zero	The SNP request Return Controller Type and ID currently returns the number of active programs as zero.
Serial I/O failure at 115K during heavy interrupt load	Rare data corruption errors have been seen on serial communications when running at 115K under heavy interrupt load on the RX3i. Under heavy load applications, users should restrict serial communications to 57K or lower.
SNP ID not always provided	Unlike the Series 90-30, the RX3i CPU's SNP ID will not appear in the Machine Edition programmer Show Status display. Service Request 11 will always return zeroes.
Second programmer can change logic while in Test & Edit mode	While currently active in a Test and Edit session using Machine Edition on one PC, Machine Edition running on another PC is not prevented from storing new logic to the RX3i.
Must have logic if powering-up from flash	If the application will configure the CPU to retrieve the contents of flash memory at power-up, be sure to include logic along with hardware configuration when saving to flash memory.
Two *Loss of Module* faults for Universal Analog Module	Occasionally, the hot removal of the Universal Analog Input Module (IC695ALG600) results in two *Loss of I/O Module* faults instead of one.

Restrictions and Open Issues

Restriction/Open Issue	*Description*
Power up of Series 90-30 HSC module may take as long as 20 seconds	As power is applied to a 90-30 High-Speed Counter, the *module ready* bit in the status bits returned each sweep from the module may not be set for as long as 20 seconds after the first PLC sweep, even though there is no *loss of module* indication. I/O data exchanged with the module is not meaningful until this bit is set by the module. Refer to *PACSystems RX3i and Series 90-30 High Speed Counter Modules User's Manual*, GFK-0293, Chapter 4.
Informational fault at power-up	Intermittently during power-up, an Informational non-critical CPU software fault may be generated with fault extra data of 01 91 01 D6. This fault will have no effect on the normal operation of the RX3i. But, if the hardware watchdog timer expires after this fault and before power has been cycled again, then the outputs of I/O modules may hold their last state, rather than defaulting to zero.
Extended memory types for IO triggers	%R, %W and %M cannot be used as IO triggers.
SNP Update Datagram message	If an Update Datagram message requests six (or fewer) bits (or bytes) of data, the RX3i will return a Completion Ack without Text Buffer. The protocol specifies that the returned data will be in the Completion Ack message, but it may not be present.
GBC30 may not resume operation after power cycle	In rare instances, a GBC30 in an expansion rack may not resume normal operation after a power cycle of either the expansion rack or the main rack.
Configuration of third-party modules	Do not specify a length of 0 in the configuration of a third-party module. The module will not work properly in the system.
Power supply status after CPU firmware update	The RX3i will report a *Loss of or missing option module* fault for the IC695PSD140 power supply following an update of CPU firmware. Also, the slot will appear empty in the programmer's online status detail view. The power supply continues to operate normally. Power cycle to restore normal status reporting.
Power supply status after power cycling	Rarely, turning a power supply on or off may not result in an *add* or *loss* fault. Also, the slot will appear empty in the programmer's online status detail view. The power supply continues to operate normally. To restore normal status reporting, cycle the power.
Don't use multiple targets	In a system in which the hardware configuration is stored from one target and logic is stored from a different target, powering-up from flash will not work. The observed behavior is that, following a power up from flash, PME reports hardware configuration and logic *not equal*.
Missing *Loss of terminal block* fault	The IC695ALG600/608/616 analog input modules do not produce a *Loss of Terminal Block* fault when hardware configuration is stored or the module is hot-inserted, and the terminal block is not locked into place.
Sequence Store Failure	When downloading projects with very large hardware configuration or which use large amounts of user memory, it is possible to encounter a *PLC Sequence Store Failure* error when writing the project to flash. To avoid this error, either or both of the following actions may be helpful: 1. Perform an explicit clear of flash prior to performing the write. 2. Increase the operation timeout used by ME prior to performing the write. This is done by expanding the Additional Configuration in the Inspector window for the target controller, and adjusting Request Timeout. The timeout may need to be increased to as much as 60000 msec, depending on the amount of memory used and the condition of the flash memory.
IC694MDL754: must configure module status bits	Always configure sixteen bits of module status when using this module. Configuring zero bits of module status will result in invalid data in the module's ESCP status bits.

Restrictions and Open Issues

Restriction/Open Issue	*Description*
IC695ALG600 Lead Resistance Compensation setting	A configuration store operation will fail if a channel is configured for 3-wire RTD and Lead Resistance Compensation is set to Disabled. A *Loss of Module* fault will be logged in the I/O Fault table at the end of the store operation. To recover the lost module, the configuration must be changed to enable Lead Resistance Compensation and module must be power cycled.
WinLoader may stop operating	On computers running Windows 2000 and using some versions of Symantec Antivirus protection, WinLoader will lock up if used in Advanced mode. To recover, cycle the computer's power.
Logic and HWC not equal after power cycle	If the Hardware Config from Target 1, with Logic/Configuration Power-up Source and Data Source both set to *Always from Flash,* is stored in Flash, and then Logic and Hardware Config from Target 2, with Logic/Configuration Power-up Source both set to *Always from RAM*, are stored to RAM and there is a good Energy Pack, when power is cycled the programmer may show that Logic and Hardware Config are *not equal*. The remedy is to clear Flash and re-store the Logic and Hardware Config from Target 2.
WinLoader does not detect PC COM port in use when upgrading PACSystems CPU	WinLoader does not detect whether a PC's COM port is in use when attempting to connect to a PACSystems CPU to perform a firmware upgrade. If the port is already in use it displays the status *trying to connect* followed by *waiting for target*. To proceed with the upgrade, press the *abort* button and disconnect the other application that is using the COM port.
WinLoader does not display error when it cannot connect serially with PACSystems CPU	WinLoader does not display an error message if it cannot connect to a PACSystems CPU to perform a firmware upgrade. This occurs if the cable is physically not connected to the CPU or if the CPU's serial port is not configured for the same baud as WinLoader. In this case Winloader displays the status *trying to connect* followed by *waiting for target*. To proceed with the upgrade, press the *abort* button and correct the cable or baud rate setting.
SRTP connections remain open after IP address changed	The Ethernet Interface does not terminate all open SRTP connections before changing its IP address. Thus, once the local IP address has changed, the privileged connection may not be available until the TCP keep-alive timeout has expired. If quicker recovery of the SRTP connection is needed, modify the *wkal_idle* Advanced User Parameter to reduce the TCP keep alive timer down to the desired maximum time for holding open the broken connection. Refer to *PACSystems RX7i & RX3i TCP/IP Ethernet Communications User Manual,* GFK-2224, for details.
REPP does not save results of aborted PING	The station manager REPP command does not retain the results of a PING that is aborted due to error. The PING results are reported when the PING is aborted, but subsequent REPP commands give the results of the last successfully terminated PING.
Multiple log events	The Ethernet Interface sometimes generates multiple exception log events and Controller Fault Table entries when a single error condition occurs. Under repetitive error conditions, the exception log and/or Controller Fault Table can be completely filled with repetitive error messages.
Clear of large hardware configurations may cause log event 08/20	A Log event 08/20 may occur when very large hardware configurations are cleared and transfers are active on other Server connections. This log event can be safely ignored.

Restrictions and Open Issues

Restriction/Open Issue	*Description*
PLC response timeout errors (8/08) in Ethernet exception log under extremely heavy SRTP traffic	Under extremely heavy SRTP traffic conditions, the Ethernet Interface may log an event in the Ethernet exception log (Event 8, Entry 2 = 08H) indicating an overload condition. This error terminates the SRTP connection. If this event appears, either the traffic load should be reduced, or the application should use an alternate communications method to verify that critical data transfers were not lost due to the overload.
SRTP channel transfers may take up to 20 seconds after power cycle	When SRTP communications are interrupted by a power cycle, the Ethernet interface may require up to 20 seconds to re-establish TCP connection used for SRTP communications.
TCP connection may timeout early if the timeout is set above 10 minutes	If the TCP connection timeout is set higher than 10 minutes, the connection may time out before the configured value. The connection timeout is derived from three AUP parameters: wkal_idle + (wkal_cnt + 1) * wkal_intvl
Station Manager PARM command help text is wrong	Although the ***parm v*** Station Manager command works correctly, the ***v*** subsystem code (SRTP server) is not shown as supported by the online help.
Blink code upon power-up	In rare occasions a blink code of 9-1-1-15 may be reported upon power up. To resume operation the unit must be power cycled again with the Energy Pack disconnected.
All CPE LEDs blinking in unison at power-up	In very rare occasions a CPE305 may power up erroneously indicating an over temperature condition (all CPU status lights blinking on and off in unison) and fail to go into run mode. To resume operation the unit must be power cycled again (with or without the Energy Pack connected.)
Watchdog Timer Trip on Logic-Initiated Read or Write of User Nonvolatile RAM	In rare instances, a *Logic Driven Read* or *Write of User Nonvolatile RAM* via Service Request 56 or Service Request 57 on a CPE310 can result in the expiration of the Software Watchdog Timer. The expiration of the Software Watchdog forces the CPE into a Stop Halt state. If this occurs the user must remove the Energy Pack and cycle power to the CPU to clear the failure mode. To resume operation the unit must then have project downloaded again from the programmer or via RDSD.

Operational Notes

***Note*:** Ethernet functionality described below only applies to Rx3i CPUs that provide an embedded Ethernet interface. Additionally, because the CPE310 does not utilize a battery, items related to battery backed memory and/or the battery itself have been removed from this section.

***Note*:** For a summary of operational differences between Series 90 and PACSystems RX3i controllers, refer to *Series 90 to PACSystems Applications Conversion Guide,* GFK-2722.

Operational Note	*Description*
Firmware upgrades using Slot 1	Firmware upgrades for modules in Slot 1 will only work for CPUs. Modules other than the CPU need to be in Slot 2 or higher to perform a firmware upgrade.
Some PROFINET configurations may be too large for IC695CPE305 memory	While the CPE305 is capable of utilizing hardware configurations with the maximum allowed PROFINET IO Device count of 255 PROFINET IO Devices, hardware configurations approaching the maximum allowed IO Submodule count of 2048 IO Submodules may nearly exhaust the available 5 MB of User Memory. Customers requiring hardware configurations approaching the maximum allowed IO Submodule count of 2048 IO Submodules should consider using a CPU model with more available User Memory, such as the CPE310, CPU315, or CPU320
Serial port operation	▪ Cable IC693CBL316 must be used for RS-232 serial connections to the CPE305. ▪ The RS-232 port does not supply the 5V power offered by earlier RX3i and Series 90-30 CPUs.
C Toolkit Application Compatibility	Beginning with Rel 7.00 of the C Toolkit, writes to %S memory will fail to compile. In previous releases a compilation warning was issued. This affects use of the GE supplied C Toolkit macros Sw(), Si(), and Sd().
Multiple calls to SVC_REQ 57 (*Logic Driven Write to Nonvolatile Storage*) in a single sweep)	Multiple calls to SVC_REQ 57 could cause the CPU to trip the watchdog timer and go to STOP-HALT mode. The number of calls to SVC_REQ 57 that can be made depends on variables such as the software watchdog timeout value, how much data is being written, how long the sweep is, age of nonvolatile storage (flash), etc. GE Intelligent Platforms recommends limiting the number of calls to SVC_REQ 57 to one call per sweep to avoid the potential of going to STOP-HALT mode.
Use of SVC_REQ 56 and 57 should be limited in frequency to avoid CPU watchdog timeouts	The *Logic Driven Read/Write to Flash* service requests are not intended for high frequency use. Depending on the amount of data being accessed and the condition of the flash memory, writing to flash could take more than one sweep interval to finish. If the application attempts to write to flash too frequently, the CPU could experience a watchdog timeout while waiting for a preceding write operation to complete. To avoid the potential for causing a watchdog timeout (resulting in the CPU going to Stop-Halt), the application should be designed such that one *Logic Driven Write* operation (SVC_REQ 57) is executed per sweep.
RUN LED is not illuminated on the Series 90-30 power supply for an RX3i remote/expansion rack with input modules only	For firmware version 6.70 and later, the RUN LED for remote/expansion racks will reflect the current IO enable/disable state (even when there are no output modules in the expansion rack). RUN LED for remote/expansion rack with input modules only works as follows for all versions prior to version 6.70: When a remote or expansion baseplate is used with the RX3i, the RUN LED on the Series 90-30 power supply for that baseplate is illuminated when the system is in Run mode only if the rack contains at least one output module. If the rack contains input modules only, the RUN LED is not illuminated. This is due to the way input modules are managed in the PACSystems design and does not indicate an error.
Undefined Symbols in C Blocks	In Release 5.00 or later, if an attempt is made to download a C block containing undefined symbols, the download will fail. Machine Edition will display the following message in the Feedback Zone: Error 8097: Controller Error – Controller aborted the request [0x05][0xFF] Prior to Release 5.00, C blocks containing undefined symbols could be successfully downloaded, but if they were executed the CPU would transition to Stop/Halt mode.

<table>
<tr><th>Operational Note</th><th>Description</th></tr>
<tr><td>Slot numbering, power supply placement, CPU placement and reference</td><td>
1. The A/C Power-Supply (IC695PSA040) for the RX3i is a doublewide module whose connector is left justified as viewed when installed in a rack. It cannot be located in Slot 11 of a 12-slot rack nor Slot 15 of a 16-slot rack. No latch mechanism is provided for the last (right-most) slot in a rack, therefore it is not possible to place the power-supply in the second to last slot.
2. When migrating a Series 90-30 CPU system to a PACSystems RX3i CPU, be aware that to maintain the Slot 1 location of the CPU, only a singlewide power-supply may be used in Slot 0. Either DC power supply can be used (IC695PSD040 or IC695PSD140). Therefore, if the application using an existing Series 90-30 system must maintain a Slot 1 CPU and uses an AC power-supply, the RX3i system must have the RX3i AC power-supply located in a slot to the right of the RX3i CPU in Slot 1.
3. In deciding to place the CPU in slots other than Slot 1, the user should be aware of the possible application migration issues that could arise. The following lists the areas that could be affected when migrating an application from one CPU slot to another.
<table>
<tr><th colspan="2">Item Affected</th><th>How Affected</th></tr>
<tr><td rowspan="3">User Logic</td><td>Service Request #15 (Read Last-Logged Fault Table Entry)</td><td rowspan="2">Location of CPU faults will not be the standard 0.1 location, but will reflect the slot the CPU is located in. User logic that decodes fault table entries retrieved by these service requests may need updating.</td></tr>
<tr><td>Service Request #20 (Read Fault Tables)</td></tr>
<tr><td>Communications Request (COMMREQ)</td><td>COMMREQs directed to the CPU (e.g. those directed to the serial ports of the CPU) will need to be updated with the correct CPU slot reference.</td></tr>
<tr><td>H/W Configuration</td><td>CPU Slot location</td><td>Slot location of the CPU must be updated in the HW Configuration to reflect the CPU's true location.</td></tr>
<tr><td>Fault Tables</td><td>Faults logged for the CPU</td><td>The location of faults logged for the CPU in the fault table will not be the standard 0.1 (rack.slot) location, but will reflect the CPU's actual slot.</td></tr>
<tr><td rowspan="4">External Devices</td><td colspan="2">Note:CPE releases prior to 7.30 can communicate only with a programmer. Additional protocols and communication with other devices are not supported.</td></tr>
<tr><td colspan="2">Series 90 PLCs
Remote Series 90 PLCs that use SRTP Channels COMMREQs expect the CPU to be in slot 1. In order to support communications with Series 90 SRTP clients such as Series 90 PLCs using SRTP Channels, the RX3i internally redirects incoming SRTP requests destined for {rack 0, slot 1} to {rack 0, slot 2}, provided that the CPU is located in rack 0 slot 2 (and the remote client has not issued an SRTP Destination service on the connection to discover the rack and slot of the CPU). This special redirection permits Series 90-30 applications that expect the power supply to be located leftmost and the CPU to be located to the right of the power supply to function. Attempts to establish channels with CPUs in slots other than 1 or 2 will fail if initiated from Series 90 PLCs.</td></tr>
<tr><td colspan="2">HMI and External Communication Devices
All external communication devices that interact with the CPU should be checked for compatibility with CPU slot locations other than slot 1. Problems may arise with, but are not limited to, initial connection sequences and fault reporting. Machine Edition View customers should select GE SRTP as their communications driver – it can communicate with a CPU in any slot.</td></tr>
<tr><td colspan="2">Host Communications Toolkit (HCT)
Applications that utilize the Host Communications Toolkit may require updated drivers.</td></tr>
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Operational Note	*Description*
Length of serial I/O buffer	Effective with Release 5.70, the *Set Up Input Buffer Function* will always allocate a buffer containing 2097 bytes. This is one byte more than previous PACSystems releases.
LD-PLC operations	Machine Edition LD-PLC no longer supports a function that connects to the PLC, downloads, and then disconnects from the PLC. The *connect* and *download* functions are now separate. To perform a download to the PLC, you must first connect to the PLC.
Duplicate station address for Modbus will conflict with other nodes	The default serial protocol for the RX3i is Modbus RTU. The default Station Address is 1. If the PLC is added to a multi-drop network, care must be taken that the PLC is configured with a unique Station Address. Nodes with duplicate Station Addresses on the same network will not work correctly.
Timer operation	Care should be taken when timers (ONDTR, TMR, and OFDTR) are used in program blocks that are NOT called every sweep. The timers accumulate time across calls to the sub-block unless they are reset. This means that they function like timers operating in a program with a much slower sweep than the timers in the main program block. For program blocks that are inactive for large periods of time, the timers should be programmed in such a manner as to account for this catch up feature. Related to this are timers that are skipped because of the use of the JUMP instruction. Timers that are skipped will NOT catch up and will therefore not accumulate time in the same manner as if they were executed every sweep.
Constant sweep	**Constant Sweep** time, when used, should be set at least 10 milliseconds greater than the normal sweep time to avoid any over-sweep conditions when monitoring or performing on-line changes with the programmer. Window completion faults will occur if the constant sweep setting is not high enough.
Large number of COMMREQs sent to module in one sweep causes faults	A large number of COMMREQs (typically greater than 8) sent to a given module in the same sweep may cause Module Software faults to be logged in the Controller fault table. The fault group is MOD_OTHR_SOFTWR (16t, 10h) and the error code is COMMREQ_MB_FULL_START (2). When this occurs, the *FT* output of the function block will also be set. To prevent this situation, COMMREQs issued to a given module should be spread across multiple sweeps so that only a limited number (typically 8 or less) of COMMREQs are sent to a given module in each sweep. In addition, the FT output parameter should be checked for errors. If the FT output is set (meaning an error has been detected), the COMMREQ could be re-issued by the application logic.
C Block standard math functions do not set errno	In C Blocks, standard math functions (e.g. sqrt, pow, asin, acos) do not set errno to the correct value and do not return the correct value if an invalid input is provided.
Upgrading firmware	▪ Upgrading the CPU firmware with the WinLoader utility may fail when multiple IO modules are in the main rack, due to the time it takes to power cycle the rack system. If the upgrade process fails, move the CPU to a rack without IO modules and restart the upgrade process. ▪ Winloader initial connect baud rate is fixed at 19200 baud. Note that the firmware download will occur at 115.2K baud by default. ▪ Note that if you have hyperterm open on a port, and then try to use Winloader on the same port, Winloader will often say *Waiting for Target* until the hyperterm session is closed.
Hot swap	Hot swap of CPUs is not supported.
Serial port configuration COMMREQs	With the following combination of circumstances, it is possible to render serial communications with the CPU impossible: ▪ User configuration disables the Run/Stop switch ▪ User configures the power up mode to Run or Last ▪ Logic is stored in FLASH and user configures CPU to load from FLASH on power-up ▪ User application issues COMMREQs that set the protocol on both of the serial ports to something that does not permit communications to the PME programmer.
Run Mode Store of EGD	Rx3i rack-based Ethernet modules (IC695ETM001) must be running firmware version 6.00 or greater to utilize the Run Mode Store of EGD feature.
LAN must be tree, not ring	The hub or switch connections in an Ethernet network must form a tree and not a ring; otherwise duplication of packets and network overload may result. In this situation, the RX3i Ethernet modules will continually reset.
Reporting of duplicate IP address	The PACSystems RX3i does not log an exception or a fault in the Controller Fault Table when it detects a duplicate IP address on the network.

Operational Note	Description
SRTP connections remain open after IP address changed	The Ethernet Interface does not terminate all open SRTP connections before changing its IP address. Once the local IP address has changed, any existing open TCP connections are unable to normally terminate. This can leave SRTP connections open until their underlying TCP connections time out. If quicker recovery of the SRTP connection is needed, modify the *wkal_idle* Advanced User Parameter to reduce the TCP keep alive timer down to the desired maximum time for holding open the broken connection. Refer to *PACSystems RX7i & RX3i TCP/IP Ethernet Communications User Manual,* GFK-2224, for details.
Lengthy CPE backplane operations	Some exceptionally lengthy CPE backplane operations, such as MC_CamTableSelect, Data Log, and Read Event Queue functions, will take longer to complete compared to other RX3i CPU models, and may delay backplane operations to IC695 modules. For example, when an MC_CamTableSelect function block is executed on the PMM335 module, the CPU's acknowledgement of the PMM355 module interrupt may be delayed. In this situation, you may see the following fault in the I/O Fault Table, even when the interrupt has not been dropped: *Error initiating an interrupt to the CPU.*
Incorrect COMMREQ status for invalid program name	The program name for PACSystems is always *LDPROG1*. When another program name is used in a COMMREQ accessing %L memory, an Invalid Block Name (05D5) error is generated.
FANUC I/O Master and Slave operation	Scan sets on the master do not work properly for the first operation of the scan set after entering RUN mode. They do work properly for subsequent scans. After downloading a new hardware configuration and logic, a power cycle may be required to resume FANUC I/O operation. Use PLCs of similar performance in FANUC I/O networks. If a master or slave is located in an RX3i system, the other PLCs should be RX3i CPUs or Series 90-30 CPU374s. Repeated power up/down cycles of an expansion rack containing FANUC I/O slaves may result in failure of the slaves' operation, with the RDY LED off.
Lost count at power-up for Serial IO Processor	The serial IO Processor (IC693APU305) will lose the first count after every power up or every time the module receives a configuration.
COMMREQ status words declared in bit memory types must be byte-aligned	In releases prior to 3.50, the CPU allowed configuration of COMMREQ Status Words in bit memory types on a non-byte-aligned boundary. Even though the given reference was not byte-aligned, the firmware would adjust it the next-lowest byte boundary before updating status bits, overwriting the bits between the alignment boundary and specified location. To ensure that the application operates as expected, release 3.50 requires configuration of COMMREQ Status Words in bit memory types to be byte-aligned. For example if the user specified status bit location of %I3, the CPU aligns the status bit location at %I1. Release 3.50 firmware requires the user to specify the appropriate aligned address (%I1) to ensure that the utilized location is appropriate for their application. Note that the actual reference location utilized is not changed, but now is explicitly stated for the user.
STOP and RUN mode transition priority	The PACSystems CPU receives requests to change between stop and run mode from many different sources. These include (but are not limited to) Proficy Machine Edition, HMIs, the user application, and the RUN/STOP switch. Since there are many potential sources for a mode change request, it is possible to receive a new mode change request while another is already in progress. When this occurs, the CPU evaluates the priority of the new mode change request with the mode change that is in progress. If the new mode change request has an equal or higher priority than the one already in progress, the CPU transitions to the new mode instead of the one in progress. If, however, the new mode change request has a lower priority than the one in progress, the new mode request is discarded and the CPU completes the mode change that is in progress. The sweep mode priorities are (listed from highest to lowest priority) STOP HALT, STOP FAULT, STOP, and RUN. **Note**: The IO ENABLED/DISABLED state is not part of the mode priority evaluation. For example, a CPU is in RUN IO ENABLED mode and a SVC_REQ 13 function block is executed to place the CPU into STOP IO DISABLED mode. Before the transition to STOP IO DISABLED is completed, the RUN/STOP switch is changed from RUN IO ENABLED to RUN IO DISABLED. In this case, the CPU ignores the new request from the RUN/STOP switch to go to RUN IO DISABLED mode because it is already processing a request to go to STOP IO DISABLED mode and STOP mode has a higher priority than RUN mode.
Nuisance faults sometimes logged for missing power supply	If a power supply is missing or has some fault that makes it appear to be missing, the CPU may improperly report (upon download of configuration) more than one fault. Such additional faults may be safely ignored and will not occur in a properly configured rack (with no mismatches or missing modules),

Operational Note	*Description*
Uploaded controller supplemental files lose date and time	Controller supplemental files uploaded from the CPU are time stamped as 8/1/1980 12:08AM regardless of PC or PLC time.

Embedded Ethernet Interface

Embedded Ethernet Interface Restrictions and Open Issues

Restriction/Open Issue	*Description*
Ethernet disconnect during word-for-word change	If the Ethernet connection is broken during a word–for-word change, the programmer may not allow a subsequent word-for-word change after reconnecting due to the fact that it thinks another programmer is currently attached. If this occurs, you should go offline and then back online again.
Possible PME inability to connect	Infrequently, an attempt to connect a programmer to an RX3i via Ethernet will be unsuccessful. The normal connection retry dialog will not be displayed. Rebooting the computer that is running the programmer will resolve the behavior.
Spurious Ethernet fault	In rare instances, after power cycle, the Ethernet Interface may log the following fault, Event = 28h, Entry 2 = 000Eh. This fault can be safely ignored.
Intermittent Ethernet log event 8H/15H after power cycle	When starting after a power cycle, the Ethernet Interface may intermittently log an exception (entry 8H, Entry 2 = 15H, Entry 3 = 0000H, Entry 4 = 00aaH). This exception is benign and may be ignored.
Station Manager PING commands	When initiating ICMP echo requests from the PLC via Station Manager's PING command, the operation occasionally fails and an exception is logged (Event eH, Entry 2 = 6H).

Embedded Ethernet Interface Operational Notes

Embedded Ethernet Interface Operational Notes

Operational Note	*Description*
Configuration of IP address is required *before* using Ethernet communications	**Note*: BOOTP and the SetIP tool in PME are not supported.*** The embedded Ethernet Interface cannot operate on a network until a valid IP address is configured. (The default IP address is 192.168.0.100.) The Ethernet addressing information must be configured prior to actual network operation, or to recover from inadvertent changes to the Ethernet addressing data at the Ethernet Interface. Use one of the following methods to initially assign an IP address: ▪ Download a CPE configuration from the Programmer using a serial connection. ▪ Download a CPE configuration from the Programmer using the Ethernet connection of an ETM001 in the same rack with a known IP address configuration.
Programmer version requirements	Proficy Machine Edition Logic Developer PLC 7.00 SIM3 or later must be used to configure the embedded Ethernet port of a CPE305.
Ethernet Event Log not preserved across power cycle	The Ethernet event log on the CPE305 is not maintained across a power-cycle. However, Ethernet log events will be reported in the Controller Fault Table as with other Rx3i CPUs. An Energy Pack can be used to preserve these entries when power is lost.
Station Manager commands	A subset of the documented Station Manager Commands will be supported for the CPE305. Refer to *TCP/IP Ethernet Communications for PACSystems Station Manager Manual,* GFK-2225J or later for details.
AUP parameter restrictions	▪ The Advanced User Parameter *wsnd_buf* should not be changed by the user. Changing the value of this parameter may cause the Ethernet Interface to drop its connection and the LAN LED to turn off. ▪ When explicitly configuring speed or duplex mode for a PACSystems RX3i port using Advanced User Parameters (AUP), do not request a store to flash as a part of the download when communicating over the CPE's embedded Ethernet port. In this situation you first must store to the RX3i and then initiate a separate request to write to flash.

Embedded Ethernet Interface Operational Notes

Operational Note	*Description*
Changing IP address of Ethernet interface while connected	Storing a hardware configuration with a new IP address to the RX3i while connected via Ethernet will succeed, then immediately disconnect because the RX3i is now using a different IP address than the Programmer. You must enter a new IP address in the Target Properties in the Machine Edition Inspector window before reconnecting.
Proper IP addressing is always essential	The PACSystems Ethernet Interface must be configured with the correct IP Address for proper operation in a TCP/IP Ethernet network. Use of incorrect IP addresses can disrupt network operation for the PACSystems and other nodes on the network. Refer to *PACSystems RX7i & RX3i TCP/IP Ethernet Communications User Manual,* GFK-2224 for important information on IP addressing. When storing a new HW configuration to the RX3i, be sure that the HW configuration contains the proper Ethernet addressing data (IP Address, Subnet Mask, and Gateway IP Address) for the RX3i. **Note:** Machine Edition programming software maintains the target IP address (used to connect the programmer to the target) independent of the contents of the HW Configuration for that target). The target IP address is set in the Target Properties in the Machine Edition Inspector window. Storing a HW Configuration whose Ethernet addressing data contains an IP Address that is different from the RX3i target IP address will change the IP address used by the target RX3i as soon as the Store operation is completed; this will break the Programmer connection. Before attempting to reconnect the Programmer, you must change the target IP address in the Target Properties in the Machine Edition Inspector window to use the new IP address. To regain communication at the former IP address, use the manual corrective action described above. Storing a HW Configuration containing incorrect Ethernet addressing data to the PACSystems RX3i will result in loss of the Programmer connection and will require manual corrective action as described above.
10Base-T / 100Base-TX auto-negotiating full-duplex Ethernet ports	The PACSystems RX3i CPU with embedded Ethernet provides a direct connection to one 10Base-T /100Base-TX CAT5 (twisted pair) Ethernet LAN cable from one network port. By comparison, Rx3i peripheral Ethernet modules (IC695ETM001) provide direct connection to one or two 10Base-T /100Base-TX CAT5 (twisted pair) Ethernet LAN cables from two network ports. In either case, the Ethernet-enabled device has only one IP address that may be used by one or two ports. Cables may be shielded or unshielded. ***Caution*** The hub or switch connections in an Ethernet network must form a tree and not a ring; otherwise duplication of packets and network overload may result. ***Caution*** The IEEE 802.3 standard strongly discourages the manual configuration of duplex mode for a port (as would be possible using Advanced User Parameters). Before manually configuring duplex mode for a PACSystems RX3i port using Advanced User Parameters (AUP), be sure that you know the characteristics of the link partner and are aware of the consequences of your selection. Setting both the speed and duplex AUPs on a PACSystems RX3i port will disable the port's auto-negotiation function. If its link partner is not similarly manually configured, this can result in the link partner concluding an incorrect duplex mode. In the words of the IEEE standard: *Connecting incompatible DTE/MAU combinations such as full duplex mode DTE to a half-duplex mode MAU, or a full-duplex station (DTE or MAU) to a repeater or other half duplex network, can lead to severe network performance degradation, increased collisions, late collisions, CRC errors, and undetected data corruption.*
Use AUPs to specify non-default Station Manager password	End-users can utilize an AUP file to set their own non-default password for Station Manager operations. GE Intelligent Platforms recommends that our customers use this functionality in their applications.

Embedded Ethernet Interface Operational Notes

Operational Note	*Description*
Send Information Report (COMMREQ 2010) requests may fail at minimum intervals less than 200 ms from embedded Ethernet port.	Send Information Report COMMREQ requests with a minimum interval between host accesses of 200 ms or less may fail if issued from the CPU's embedded Ethernet port. A COMMREQ Status Word value of 0290H, *Period expired before transfer completed; still waiting on transfer* indicates this condition occurred. To work around this issue, the user can set the minimum interval between host accesses to a value greater than 200 milliseconds if issuing a Send Information Report COMMREQ from the CPU's embedded Ethernet port.
Modbus/TCP Client Channels require at least a 10 ms delay between bulk channel close and bulk channel open processing	On CPUs with embedded Ethernet ports, a delay of at least 10 milliseconds must occur between logic-driven attempts to close sixteen Modbus/TCP Channels simultaneously and a then re-open 16 Modbus/TCP Channels. This delay is necessary to provide external Modbus/TCP Servers sufficient time to close all channels before the Client issues channel open requests.

Removable Data Storage Devices (RDSDs)

For full details on RDSD operation, refer to the *PACSystems RX3i and RX7i CPU Reference Manual,* GFK-2222R or later.

RDSD Restrictions and Open Issues

Restriction/Open Issue	*Description*
Default RDSD Write to Flash value is 'N' when no *Options.txt* file is created	The default RDSD Write_Flash value is 'N'. Storing a project from the RDSD to the CPE305 will result in the files not being written to user flash if no *Options.txt* file is included on the RDSD device.
RDSD upload / unintended OEM protection lock	When an OEM key is set in a controller, and the controller is unlocked, if an RDSD upload is performed, in rare occasions OEM protection will be unintentionally locked after the upload completes. To recover, enter OEM password to unlock the project, then clear the user memory and flash memory.

RDSD Operational Notes

Operational Note	*Description*
RDSD / Programmer Interaction	When using RDSD, all Proficy Machine Edition Logic Developer PLC connections must be in the Offline state for the RDSD to function properly.
RDSD OEM / Password Protection of Former Uploads Incorrectly Maintained	When deleting an OEM key from a project, you must remove the Energy Pack and cycle power before writing to the RDSD. If this procedure is not followed there are rare occasions where the OEM key that had been deleted may be restored on the RDSD device and therefore could be unexpectedly downloaded to the CPU on a subsequent RDSD download.

Energy Pack Operational Notes

For details on the Energy Pack, refer to the datasheet *PACSystems RX3i Energy Pack, IC695ACC400 IPI*, GFK-2724.

The %S0014 (PLC_BAT) system status reference indicates the Energy Pack status as follows:

0 Energy Pack is connected and functioning.

1 Energy Pack is not connected or has failed.

Note: When the Energy Pack is powered up for the first time, or is in a system that has been powered down long enough to completely discharge the Energy Pack, it may require a few seconds for it to charge up to its operating level. The CPU's STATUS LED will blink green during this time.

Note: Because the Time of Day (TOD) clock is powered by the Real Time Clock battery, removal of the Energy Pack does not cause the CPU to lose the TOD value.

Power-Up Characteristics

The Conditional Power-up From Flash feature works the same as in previous Rx3i CPUs: that is if the configuration is configured for *Conditional – Flash* and the Energy Pack is disconnected or has failed, the contents of flash will be loaded into RAM at power up. The CPU's logic and configuration source and operating mode at power-up are in accordance with the tables in *PACSystems RX3i and RX7i CPU Reference Manual,* GFK-2222, section 4.7, where *memory not preserved* means that the Energy Pack is not connected or not working. The contents of those tables apply as follows:

- All entries in the *Logic/Configuration Source and CPU Operating Mode at Power-Up* table which address *Logic/Configuration Power-Up Source in User Memory* apply to Logic/Configuration as if there were a battery.
- The condition *Memory not preserved (i.e., no battery or memory corrupted)* is created on a CPE305 by power cycle with the Energy Pack removed.
- The condition *No configuration in User Memory, memory preserved* is created on a CPE305 by clearing configuration (or never downloading configuration), and then cycling power with the Energy Pack connected.
- The conditions for Logic/Configuration source of *Always Flash*, *Conditional Flash* and *Always RAM* are created by setting the appropriate configuration setting in the CPE305 and cycling power with the Energy Pack connected.
- User memory is preserved only if the Energy Pack is connected (and charged) at power-down. Similarly, user memory is preserved only if the Energy Pack is present at power-up.
- The user memory is preserved on a CPE305 by an Energy Pack connection at the instant of power-down and the instant of power-up. Removing or reconnecting the Energy Pack while the CPE305 is not powered has no effect on the preservation of user memory.

Energy Pack Replacement

If an Energy Pack fails, you can replace it with a new unit while the CPU is in operation. When an Energy Pack is replaced, the new Energy Pack must charge. If a loss of power occurs while the Energy Pack is disconnected or before it is fully charged, a memory loss may occur.

Product Documentation

PACSystems RX3i and RX7i CPU Reference Manual	GFK-2222
PACSystems RX3i and RX7i CPU Programmer's Reference Manual	GFK-2950
PACSystems RX3i System Manual	GFK-2314
PACSystems RX3i IC695CPE305 CPU Quick Start Guide	GFK-2934
PACSystems RX7i & RX3i TCP/IP Ethernet Communications User Manual	GFK-2224
PACSystems TCP/IP Ethernet Communications Station Manager User Manual	GFK-2225
PACSystems RXi, RX3i, and RX7i Controller Secure Deployment Guide	GFK-2830
PACSystems HART Pass Through User Manual	GFK-2929

User manuals, product updates and other information sources are available on the GE Intelligent Platforms Support website, http://www.ge-ip.com/support, under *Controllers and IO*, *RX3i Controllers*.